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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,609	05/08/2001	Gregory T. Stauf	Atmi-497	8601

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ATMI, INC.
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EXAMINER

LE, THAO X

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 09/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

09/681,609

STAUF ET AL.

Examiner

Art Unit

Thao X Le

2814

-- Th MAILING DATE of this communication appears on th cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1-6, 9-18, 20, 23, 25-26, 30-31 are rejected under 35 U.S.C. 102(e) as being anticipated by US Pub. 2002/0006674 to Ma et al.

Regarding to claim 1, Ma discloses a microelectronic structure in fig. 1 comprising: at least one layer of high dielectric constant material 126 [0035], at least one conductive barrier layer 124 [0034] in contact with the layer of high dielectric constant material, wherein such conductive barrier layers comprises at least one material selected from the group consisting of Pt, Ir, IrO₂, Ir₂O₃, Ru, RuO₂, binary metal nitrides, ternary metal nitrides, and compatible combination, mixtures and alloys thereof, at least one metal layer 114 in contact with the conductive barrier layer, wherein the metal layer comprises metal or metal alloy including a material selected from the group consisting of Cu and Al [0029] and [0031].

Regarding to claims 2-3, Ma discloses a microelectronic structure wherein binary metal nitrides and ternary metal nitrides 122 are selected from the group consisting of TaN, NbN, HfN,

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ZrN, WN, W₂N, TiN, TiSiN, TiAlN, TaSiN, and NbAlN, and wherein the conductive barrier comprises TiAlN [0033].

Regarding to claims 4-5, Ma discloses a microelectronic structure wherein the metal layer 114 comprises Cu, Cu alloy, Al or Al alloy [0029] and [0031].

Regarding to claim 6, Ma discloses a microelectronic structure wherein the layer of high dielectric constant material 126 comprises a complex metal oxide selected from the group consisting of SBT, BT, and PZT [0035].

Regarding to claims 9-10, Ma discloses a microelectronic structure wherein conductive barrier layer 124 has a thickness in a range of from 1 nm to about 100 nm and 5nm to about 20 nm [0034].

Regarding to claim 11-17, Ma discloses a microelectronic structure wherein conductive barrier layer comprises Pt, Ir, IrO₂, Ru, RuO₂, TiAlN [0033] and [0034].

Regarding to claim 18, Ma discloses a microelectronic structure in fig. 1 comprising a first conductive barrier layer 124, a second conductive barrier layer 122, wherein the first conductive barrier is in contact with the layer of high dielectric constant material 126, the second conductive barrier layer overlies first conductive barrier layer and is in contact with the metal layer 114.

Regarding to claim 20, 23, 25, Ma discloses a microelectronic structure in fig. 1 comprising a first conductive barrier layer 124 comprises Pt, Ir, IrO₂, [0034], a second conductive barrier layer 122 comprises TiAlN [0033]

Regarding to claim 26, Ma discloses a microelectronic structure in fig. 1 comprising a first conductive barrier layer 128, a second conductive barrier layer 130, and a third conductive

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barrier layer, wherein the first conductive barrier is in contact with the layer of high dielectric constant material 126, the second conductive barrier layer overlies first conductive barrier layer, and third conductive barrier layer overlies second conductive barrier and is in contact with the metal layer 136.

Regarding to claims 30-31, Ma discloses a microelectronic structure in fig. 1 comprising: at least one layer of amorphous SBT or PZT material 126 [0035], a one conductive barrier layer 124 [0034] in contact with the layer of high dielectric constant material 126, comprising at least one material selected from the group consisting of Pt, Ir, IrO₂, Ir₂O₃, Ru, RuO₂ [0034], at least one metal layer 114 in contact with the conductive barrier layer comprises Cu [0029].

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 7-8, 19, 21-22, 24, 27-29, 32-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2002/0006674 to Ma et al in view of US 5617290 to Kulwicki et al.

Regarding to claims 7-8, Ma does not expressly disclose the layer of high dielectric constant material comprises perovskite BST or amorphous BST.

However, Kulwicki reference discloses the high dielectric constant material comprises perovskite BST or amorphous BST, column 4 line 60. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the BST high dielectric constant material teaching of Kulwicki to replace the high dielectric constant 126 of Ma, because such material replacement would have been considered a mere substitution of art-recognized equivalent values.

Regarding to claims 19, 21-22, 24, Ma discloses a microelectronic structure wherein the first conductive barrier 124 comprises Pt, Ir, or IrO₂ [0034],

However, Ma dose not discloses the second conductive barrier122 comprises IrO₂ or Ir

But Ma clearly discloses the second conductive barrier 122 can be other conductive material [0033] such as layer IrO layer 128 or Ir layer 130 [0036]. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use IrO₂ teaching of Ma as claim, because such material replacement would have been considered a mere substitution of art-recognized equivalent values.

Regarding to claim 27, Ma discloses a microelectronic structure wherein first conductive barrier layer 128 comprises IrO₂.

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But, Ma does not expressly disclose the second conductive barrier comprises Ir_2O_3 and the third conductive barrier layer comprises Ir.

However, Ma discloses iridium oxides or iridium can be use as a conductive electrode layers such as 124, 130, [0034] and [0036]. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the iridium oxides or iridium electrode teaching of Ma as claimed, because it would have created a electrode stable in oxygen [0034].

Regarding to claims 28-29, as discussed in claims 7 and 19, Ma discloses all the limitation in claim 28.

Regarding to claims 32-39, Ma discloses a microelectronic structure comprises different device such as capacitor, EEPROM, FLASH EEPROM, FeRAM, DRAM, see background of the invention and summary of the invention. Therefore, it would have been obvious to one of ordinary skill in the art to apply the microelectronic structure teaching of Ma for intended use.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. US 6358810
- b. US Pub 2001/0044205
- c. US Pub. 2002/0072223
- d. US 6211005
- e. US 6417537

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- f. US 6280579
- g. US 6180482
- h. US 5729054
- i. US 6184044
- j. US 6291292
- k. US 5453908
- l. US Pub 2001/0040249
- m. US 6294420

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on M-T from 7:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Thao X. Le
September 17, 2002


PHAT X. CAO
PRIMARY EXAMINER